

**FINAL REPORT**

**ON**

**A RESEARCH ON DISTRIBUTION, POPULATION SIZE CLASSES,  
REPRODUCTION STATUS, THREATS AND MANAGEMENT OPTIONS FOR  
C.I.T.E.S. NON-DETRIMENT FINDINGS OF *CYCAS THOUARSII* IN MOZAMBIQUE**



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**1. Title of the project: A RESEARCH ON DISTRIBUTION, POPULATION SIZE CLASSES, REPRODUCTION STATUS, THREATS AND MANAGEMENT OPTIONS FOR C.I.T.E.S. NON-DETRIMENT FINDINGS OF *CYCAS THOUARSII* IN MOZAMBIQUE**

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## Summary

*Cycas Thourasii* is a CITES appendix II plant species and this study attempted to document a non-detrimental finding of this species in Mozambique as trade of the species seems increasing. Extensive field trips were conducted to the coastal regions around lower Zambezi river in Central Mozambique and the following results were documented:

Historical herbarium collection reported this species in central and northern Mozambique (provinces of Cabo Delgado, Nampula, Zambézia and Sofala), all from cultivated plants. This project confirmed existence of this species also in gardens in Maputo city.

Around 200 adult female individuals were estimated for entire country (tallest plants, with up to 7 meters up to leaves level, were found in Quelimane town). Each adult can attain tens of leafy buds or sprouts (of different sizes) attached to the stem and, most of them can be transplanted and turned into a new individual.

All plants were female. Male *Cycas thouarsii* have never been seen in Mozambique or Kenya.

Erosion appears to be main threat to this species as the entire Timbue population (planted in the second light house at Timbue, Zambezi river delta) vanished due to erosion that destroyed the light house in 1987. Accounts indicate use of sap as glue to paper (non-destructive application)

*C. thouarsii* appears not being a native species to Mozambique as wild population do not exist (found that Timbue population were planted in a lighthouse near Zambezi delta branch). Corroborating this is the absence of the male plants in Mozambique (we visited Kenya 4 times and several planted *C. thouarsii* female plants were observed but none were male plant).

This study managed to visit Timbue once believed to be a native site but turned that *Cycas* there were planted in the light house. Accounts of Melambe river (southern Zambezi delta branch) indicated, as per the interviews with fisherman, inexistence of native *Cycas*.

## 1. Introduction

This document is a final progress report on the project “A research on the biology, reproduction and size classes for a Non-Detriment finding assessment of the species *Cycas thouarsii* in Mozambique” that was carried out in central Mozambique.

*Cycas thourasii* is an Appendix II CITES species. Under CITES its international trade must be regulated through the intervention of the CITES Management Authority. Under Mozambican Red Data List *Cycas thouarsii* is listed as data deficient (Izidine & Bandeira, 2002). As per the literature this species appeared to have a quite narrow distribution in central Mozambique, associated with Zambezi valley and coastline as per floristic work (Flora de Moçambique and Flora Zambesiaca) and other literature (Coates-Paggrave 2002,).

The Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES) recognizes that international cooperation is essential for the protection of certain species of wild fauna and flora against over-exploitation through international trade (CITES, 2010). One of the measures adopted by CITES to reduce the over-exploitation of the species is the non-detriment finding (NDF) procedure. NDF procedure essentially requires proof that the level of exports and associated harvesting is non-detrimental to the survival of the species in the wild or to their role in the ecosystem (Rosser and Haywood, 2002).

For the species listed on the Appendix II, such as the case of the *Cycas thouarsii*, the Convention requires among other things that an export permit shall only be granted when a Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of that species. This advice will only be possible to give knowing the conservation status of species. *Cycas thouarsii* was traded from Mozambique until 2005, but this trade ceased following the CITES trade suspension in 2006.

Therefore accurate geographical distribution, and conservation status of wild populations of the suspended species are urgent in order to fulfil the requirements of

CITES and the trading countries and ensuring this way a sustainable management of natural resources.

## **2. Objectives**

### **2.1. Main Objective**

- Perform a scientific research on the biology, reproduction and size classes for a Non-Detriment finding assessment of the species *Cycas thouarsii* in Mozambique.

### **2.2. Specific objectives**

- Determine the distribution of *Cycas thouarsii*;
- Determine the population size and reproductive status of *Cycas thouarsii*;
- Evaluate the availability of habitat for *Cycas thouarsii*;
- Evaluate threats to the above mentioned species;
- Provide management options for this species.

## **3. Material and Methods**

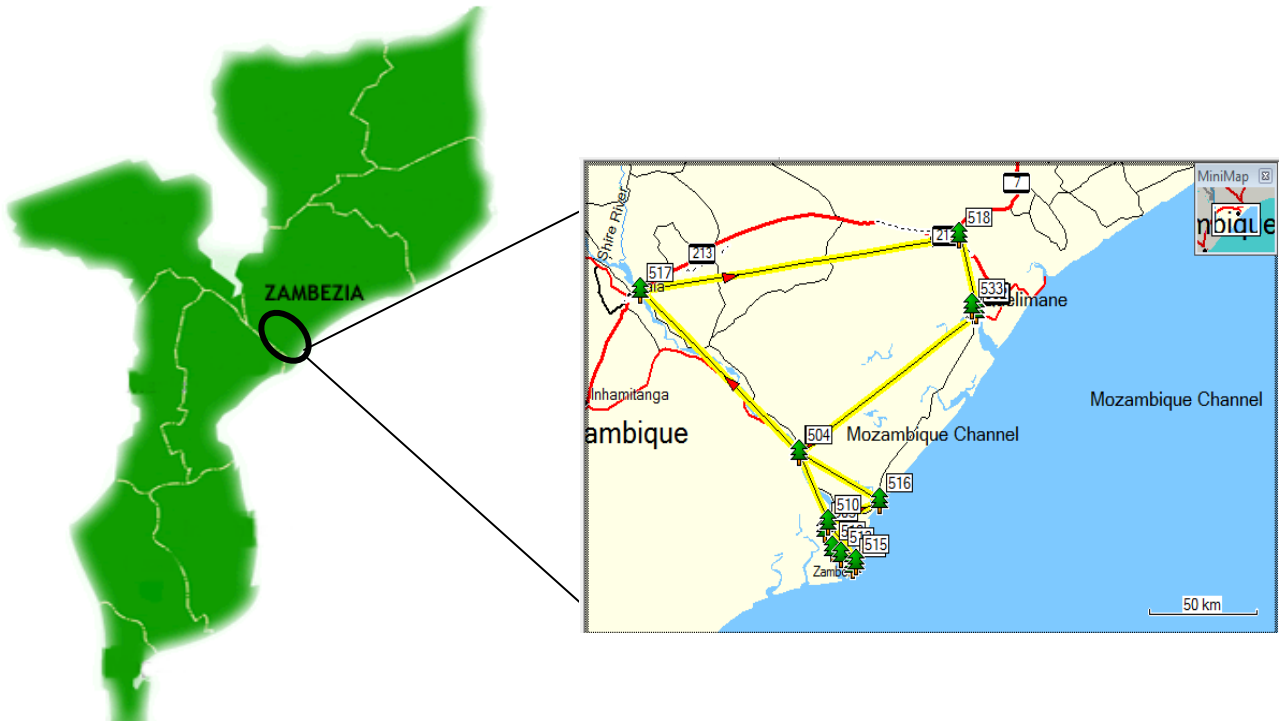
In order to achieve the objectives outlined, the study followed a standard assessment for making NDF. For that we did a literature review, a field trip to the regions where known collections occurred, also as per records of plant collections from Herbaria (LMU, and LMA in Maputo) and floristic publications (Flora de Moçambique and Flora Zambesiaca). Field trip covered the regions around the lower Zambezi river specially the delta (province of Zambezia and Sofala)

A first trip to the site was carried out in June (27<sup>th</sup> June-2 July 2011) during dry season as to allow vehicle passage in a difficult terrain into coastal remote areas of central Mozambique. A second trip was carried out in the period 26<sup>th</sup> September to 2<sup>nd</sup> October 2011). The trip followed the route: Quelimane- Luabo – Matilde –Zodoca – Timbwé – Matilde – Chinde – Luabo – Chimuara – Nicoadala – Quelimane (as shown the map

bellow), in accordance of statements of the local community who claimed to have already observed the species.

A Questionnaire was carried out with people on the regions were *C thouarsii* occurs as a mean to gather more information on the species (See Appendix).

Furthermore we sent email to the Editor of Flora Zambesiaca (Jonathan Timberlake, Kew Gardens, London) to request more information on possible locations based on wider existing distribution record of the species.



**Figure 1** – The route followed in the second field trip.

## 4. Results

### 4.1. Distribution of *Cycas thouarsii*

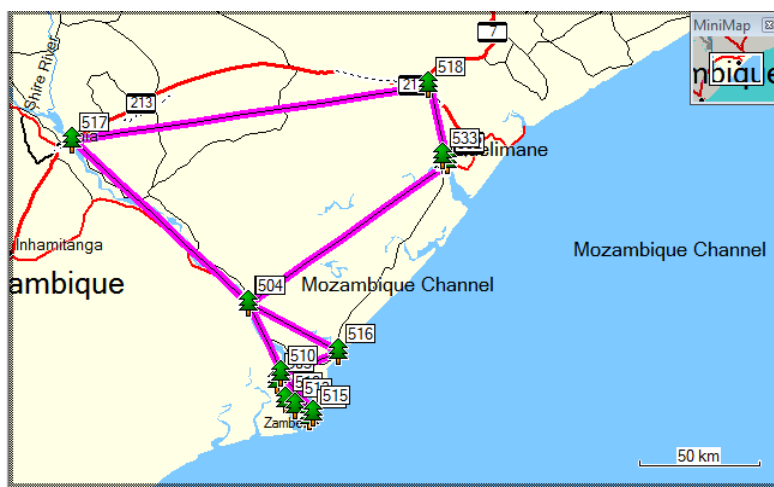
- Literature Information

As per the literature this species is reported with certainty being native in Madagascar, and it has been becoming a common sight in villages north of the Zambezi River, where the climate and other environmental conditions promote their growth (Goode 2001).

According to the herbarium records, as well as information provided by the Flora Zambesiaca editor (Kew Gardens, London) this species was found:

- **Cabo Delgado:** Macondes, next to Rovuma river;
- **Nampula:** Around Monapo River and Moma – where was probably cultivated;
- **Zambézia:** Pebane, Quelimane (cultivated in a public garden next to the sea), in Luabo River (probably brought by the old settlers), Timbwé (next to a lighthouse destroyed a few years ago)
- **Sofala:** at the Zambezi delta, along the coast between Kongone and Melambe mouths.

Results of literature researches says that, this species occurs naturally in central Mozambique, especially in the Zambezi river Delta, despite for some its appearance be considered mysterious (Goode 2001).



**Figure 2** - Places where *Cycas thouarsii* specimens were observed in the second field trip.

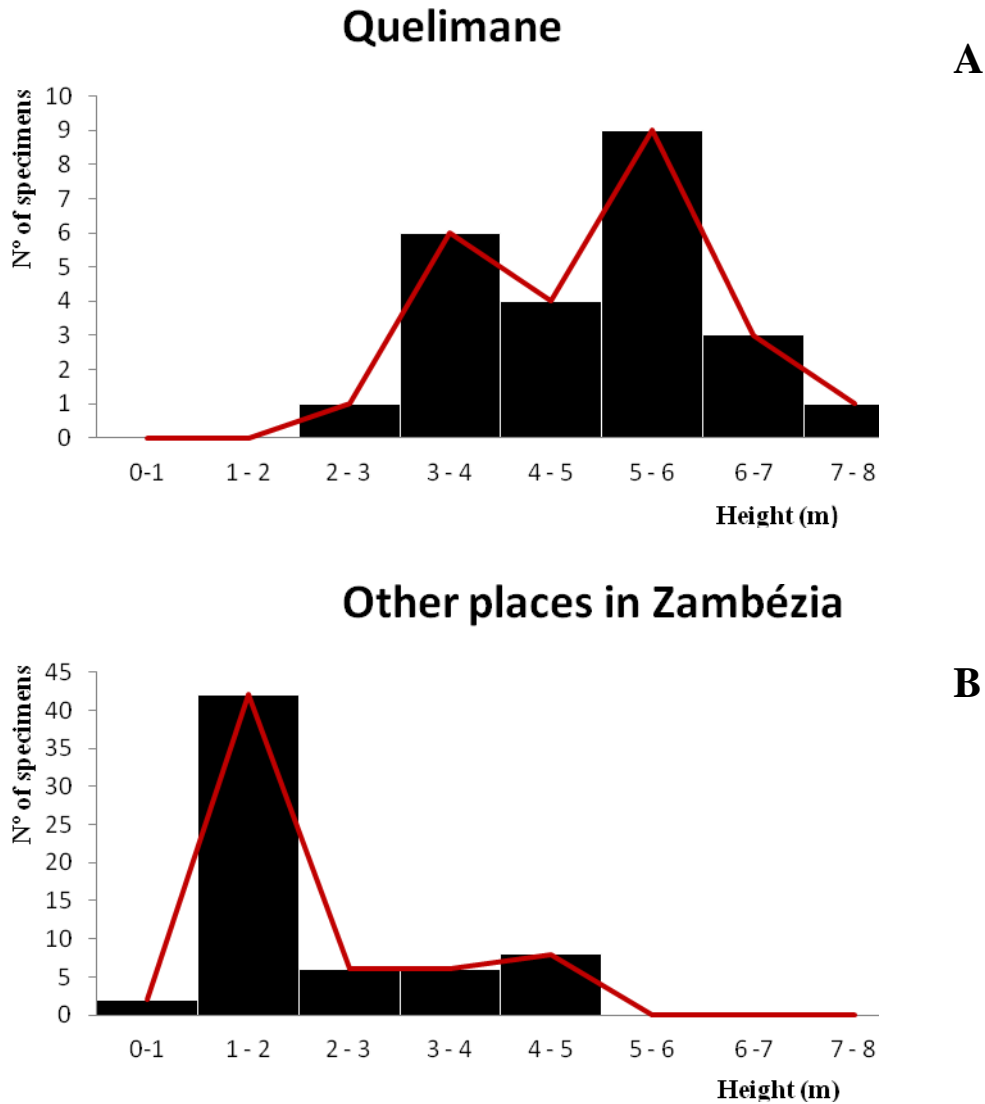


**Table 1** – Number, size and sex of the specimens found in different places of the province of Zambézia

Place	Coordinates		Nº of specimens observed	Nº of specimens estimated	Height	Lenght	Sex
	Latitude	Longitude					
Luabo (Praça dos trabalhadores)	19, 3990 °N	79, 62616 ° W	5	5	3 m	-	Female
			30	30	1 m	-	Females
Luabo (Bairro dos ingleses)	19,4145°N	79,6237° W	5	5	2 m	-	Females
			6	6	1 m	-	Females
Luabo	19,4236°N	79,6238°E	1	1	1, 5 m	-	Female
			1	1	2 m	-	Female
Luabo	19,4543°S	79,62572°E	1	1	1, 8 m	-	Female
<b>TOTAL SPECIMENS IN LUABO</b>			<b>49</b>	<b>49</b>			
Matilde	20,8552°N	79,33598°E	1	3	3, 5 m	-	Female
Zodoca	20,7090°S	79,30709°E	NO SPECIES FOUND				
Timbwé	22,0406°S	79,15936°E	NO SPECIES FOUND				
Chinde	23,32197°N	79,43239°E	1	5	3,5 m	-	Female
<b>TOTAL IN CHINDE</b>			<b>1</b>	<b>5</b>			
Chimuara (Cuáqua Lodge)	-	80,3095°W	2	2	1 m	0,16 m	Females
			1	1	1, 4 m	0,18 m	Female
			1	1	1 m	0,12 m	Female
			2	2	0,8 m	0,1 m	Females
<b>TOTAL in Chimuara</b>			<b>6</b>	<b>6</b>			
Nicoadala	26,8192°N	80,53208°E	1	1	3 m	0,19 m	Females
Mucopia	-	-	12	12	-	-	-
Zalala	-	-	5	11	-	-	-
Micaune	-	-	-	6	-	-	-
Gonhane	-	-	1	2	-	-	-
Quelimane	27,6223°S	80,214554°E	1	1	6 m	0,5 m	Female
	27,5943°S	80,22490°W	1	1	5,5 m	0,3 m	Female

			1	1	5 m	0,50 m	Female
	27,5634°N	80,22368°E	1	1	6 m	0,45 m	Female
			1	1	4 m	0,42 m	Female
Quelimane (EDM Building)	27,5634°N	80,22368°E	1	1	3 m	0, 69 m	Female
Quelimane	27,5473°S	80,22086°	1	1	4,8 m	0,45 m	Female
			1	1	5 m	0,45 m	Female
Quelimane (CFM - Building)	27,5416°S	80,22053°	2	2	5,5 m	0,51 m	Females
Quelimane	27, 6399°S	80,21536°E	2	2	5 m	0,57 m	Females
	27,6344°S	80,21816°E	1	1	3,5 m	0,30 m	Female
	27,6410°S	80,21911°E	1	1	6,5 m	-	Female
			1	1	7 m	-	Female
	27,6498°S	80,21944°E	1	1	2 m	0,23 m	Female
			1	1	5,5 m	0,4 m	Female
	27,6640°S	80,21848°E	1	1	4,5 m	0,25 m	Female
			1	1	4 m	0,28 m	Female
	27,6719°S	80,21754°E	1	1	3 m	0,30 m	Female
			1	1	5 m	-	Female
	27,6699°S	80,22159°E	1	1	5 m	0,30 m	Female
	27,6444°S	80,22356°E	1	1	5 m	0,30 m	Female
Quelimane (Airport)	27,4588°S	80,24273°E	1	1	3 m	0,30 m	Female
			1	1	3 m	0,40 m	Female
			1	1	3 m	0,35 m	Female
Quelimane	-	-	-	26	-	-	-
<b>TOTAL in Quelimane</b>			<b>26</b>	<b>52</b>			
<b>TOTAL</b>			<b>103</b>	<b>152</b>			

#### 4.2. Population size



**Figure 2** – Population size of *Cycas thouarsii* in Quelimane (A) and in other places in Zambézia (B).

As can be seen in the Figures above, Quelimane presents specimens of larger size in comparison to the specimens observed in other parts of Zambézia, suggesting the presence of older individuals in Quelimane.

#### 4.3. Availability of habitat for *Cycas thouarsii*

Most of the region around the coastal central Mozambique present suitable habitat for the growth of *C.thouarsii*. These conditions include a hot humid climate with frost-free winters. Indeed this species does well in almost all coastal regions of Mozambique (as well as in areas of Tanzania and Kenya where several *C thouarsii* were seen planted in several resort areas of Mombasa, Kenya).

The Zambezi delta and surroundings appears as ideal habitat for the species given not just the climate but also the rich soils and observed in *C. thouarsii* dense areas of Quelimane and Luabo (see photo below)



Photo. Cycas gardens in Luabo (*C thouarsii* mixed with other palm species), S  
Bandeira

#### 4.4. Threats

According to the literature this species is rarely used by the population, however plants could be impacted by collectors, coastal developments (tourist resorts, urban expansion) and agricultural expansion (small-holder crops) (IUCN, 2011).

This project has identified few threats to the species. 1. Erosion as occurred at Timbué light house (Zambezi river mouth) (See photo below) which destroyed the known Herbarium vouchers specimens on site; 2. Urban expansion - example of one old plant cut for market expansion at Matilde village (Zambezi delta); 3. Uncontrolled fires that affected the plants at Luabo village. Accounts indicated a sustainable use of its sap as glue for paper.



Photo. Timbué light #2 house built in 1976 and later destroyed in 1987 due to erosion. This is believed to be one of the sanctuary of *C. thouarsii* that might have irradiated the region. Timbué light house # 1 (still with one structure visible emerging from under water) is located some 100 m to the #2. Accounts from fishermen indicates that this structure (light house #2) was located some 10m above sea-level The photo indicates the remains of pillar, light house proper , whell (not featured) and a student. Accounts from



fisherman indicates at least 10 old *Cycas thouarsii* plants were planted on top of this light house. Destruction of these light houses occurred throughout quite extensive period, and the main reason for this erosion appears to be natural causes but also possible changing in water regimes of the river due to possible changes of sediments deposition that appeared to support building up to the Delta coastal margins. Photo: S Bandeira

## 5. Discussion

- Unsolved issue of the origin of *C. thouarsii* in Mozambique. This study reignites the debate of the origin of *C. thouarsii* in Mozambique. See below comments from the editor of the Flora Zambesiaca (encompasses most countries of southern Africa including Moz.).
- Comments from the Editor of Flora Zambesiaca and internet

*"This is what I could find on Cycas thouarsii in Mozambique... 1. Good, Cycads of Africa (2002) p.303 states that how C. thouarsii arrived on the east coast of Africa is a mystery. It would seem to need a hot humid climate, frost-free winters, and higher rainfall. It is certainly native in Madagascar. It has been becoming a common sight in villages north of the Zambezi River. There were 1000 plants around Quelimane, and it is spreading inland from the coast. 2. There is nothing in Capella's 2006 book on cycads in Mozambique (only on Encephalartos). 3. There are three separate collections from Mozambique of the species in the Herbarium... a) B.A. Key 2, iv.1946. cultivated?, called "palmierrmka". "Mozambique District", around Monapo River. [4 specimens] b) A.R. Torre & M.F. Correia 17497, 8.ii.1968. Quelimane, by the sea. Cultivated in a public garden [1 specimen] c) J. Kirk, no number, 29.v.1858. Collected on Livingstone's Expedition from Luabo River [2 specimens] Sorry this is not much information, but all I could find. No news yet from Commonwealth people. I am not sure when we will get an answer. Best wishes, Jonathan Timberlake (editor, Flora Zambesiaca)"*

Internet comment:

"*Cycas thouarsii*, apparently the most ancient of the many species judging from chromosome pattern studies, is present in India, Madagascar, and Africa. It is still debatable, though, whether it is a native or was introduced into some of these areas. Perhaps seeds were carried there and to the Mascarene Islands and around Asia by tropical storms. Or it might have been brought west out of Asia in "recent" times by Arab traders. Mankind has had a long fascination with cycads as a thing of beauty and as a source of food (however deadly)."

Site: [http://www.plantapalm.com/vce/evolution/fossils\\_pg22.htm](http://www.plantapalm.com/vce/evolution/fossils_pg22.htm)

- *C. thouarsii* is an easy species for propagation in tropical regions
- The absence of male plants may be related with the fact that this species is an introduced ones (non-indigenous).
- According to the statements of the local community this species was brought long time ago by the Portuguese/English people, which is in agreement with what was observed, since the majority of specimens where found in houses previously inhabited by the Europeans.
- Threats to the species in Mozambique: almost inexistence with exception to the impact of erosion.
- Zambeze delta and surrounds would be an appropriate habitat for the species expansion. Unfortunately all potential sites were covered with palm species and other savanna species /coastal species
- Management options for this species includes the continuing planting the emerging outgrowths from adult *C thouarsii* stems
- If this species has never been native to the Mozambique its trade status from plants from Mozambique needs to be re-assessed.

## 6. Conclusions

This study summarizes the extensive distribution of *Cycas thouarsii* in Mozambique with special reference to the regions in the Zambezi lower river and delta as well as Zambezia province in Mozambique. Around 200 adult individuals were estimated for Mozambique, mostly occurring near Zambezi delta with taller individuals in remote regions and Quelimane town. The extensive field work carried out, covered also previous areas where Herbarium vouchers were collected decades ago. The Zambezi delta and province of Zambezia, does not possess wild populations of *Cycas thouarsii*. As in the past this study re-ignites the discussion on existence of native strands of *C thourasii* in Mozambique (Goode 2001 questions this species being native to central Moz; Flora Zambeziaca/Flora de Mozambique do not sustain native stands of the species). Furthermore, a male individuals has never been seen or confirmed from the interviews. If this is further corroborated the trade status of *C.thouarsii* from Mozambique needs to be re-assessed.

## 7. References

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Photo: New gardening with *C. thouarsii* in Mucopia (between Zambezi delta and Quelimane town). At least 20 Leafy sprouts were used for the outer and inner gardens . S Bandeira



## 8. Appendixes

### 1. *Questionnaire undertaken to inquiry additional potential occurrence of Cycas thouarsii:*

### Inquérito sobre *Cycas thouarsii* em Moçambique

Nome: \_\_\_\_\_ Idade \_\_\_\_\_ Gênero \_\_\_\_\_

1. Alguma vez teve a oportunidade de ver esta espécie de planta?

☐

Sim

☐

Não

2. Qual \_\_\_\_\_ é \_\_\_\_\_ o \_\_\_\_\_ seu \_\_\_\_\_ nome  
local? \_\_\_\_\_

3. Onde \_\_\_\_\_ é \_\_\_\_\_ que \_\_\_\_\_ observou \_\_\_\_\_ esta \_\_\_\_\_ planta?  
\_\_\_\_\_

4. Assinale \_\_\_\_\_ no \_\_\_\_\_ mapa  
\_\_\_\_\_

5. Caracterize o solo, vegetação, clima (etc), regime inundação desse local?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. Quantas plantas grandes e pequenas ocorrem nesse local?  
\_\_\_\_\_  
\_\_\_\_\_

7. Qual o tamanho que esta planta chega a atingir quando adulta?  
\_\_\_\_\_  
\_\_\_\_\_

8. Quanto tempo leva a atingir a fase adulta? Com quanto tempo se inicia a formação dos estróbilos (cones alaranjados)? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

9. Proporção dos estróbilos F e M? \_\_\_\_\_

10. Qual o tipo de fauna que pode ser vista acompanhando esta espécie?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**11.** Qual é a maior ameaça que esta planta sofre?

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**12.** Alguém tem vindo de fora para tirar esta planta nestas áreas naturais de ocorrência?

Quem, Quando e numero de plantas tiradas? \_\_\_\_\_

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**13.** Porquê esta planta aparece só nos rios? \_\_\_\_\_

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**14.** Como pensa que a população pode contribuir para a preservação desta planta?

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2. Field plate used in the field

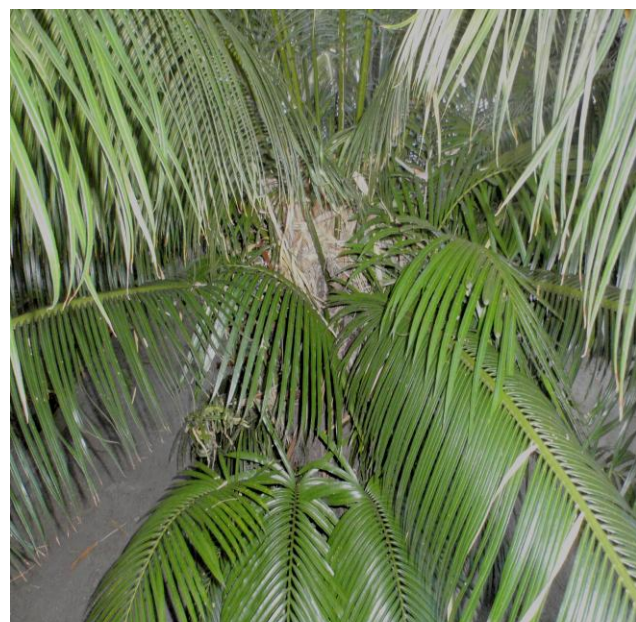
*Cycas thouarsii*



*Cycas thouarsii* no seu ambiente natural



*Cycas thouarsii* no seu ambiente natural



Detalhe da folha de *Cycas thouarsii*





*Cycas thouarsii* no seu ambiente natural



Detalhe do estróbilo masculino de *Cycas thouarsii*



Detalhe do estróbilo feminino de *Cycas thouarsii*